35. A method in accordance with claim 34, wherein R^3 represents an alkylene group having 2 to 8 carbon atoms, R^4 and R^5, respectively, represent an alkyl group having 1 to 4 carbon atoms, and X^- represents a halogen ion, $CH_3OSO_3^-$ or $C_2H_5OSO_3^-$.

36. A method in accordance with claim 26, wherein a mixing ratio by weight of the water-absorbing polymer compound (a) and the cationic polymer compound (b) is between 50/50 and 99/1.

37. A method in accordance with claim 26, further comprising (c) a cationic or nonionic surface active agent.

38. A method in accordance with claim 37, wherein an amount of the cationic or nonionic surface active agent (c) is from 1% by weight to 10% by weight.

REMARKS/ARGUMENTS

§112 REJECTION

It is assumed that the rejection of clam 15, set forth in paragraph 2 of the first Office Action was intended for claim 18, since claim 15 depends from remaining claim 14, and claim 18 was dependent on cancelled claim 9. Claim 18 has been amended to eliminate its dependency from claim 9. Accordingly, the rejection under 35 U.S.C. §112, should be withdrawn.

PRIOR ART REJECTIONS

An ink acceptance layer in JP11-123869 is overlaid on a glue line that is formed on a support base-material layer, whereas the resin composition of the present invention is used for forming an ink-receiving layer directly formed on a substrate layer without interposing a glue line. The resin composition of the present invention has both high performance as an ink-receiving layer and high adhesiveness to a substrate layer despite the absence of the glue line.

To obtain such characteristics, the inventors of the present invention have mproved the miscibility between the water-absorbing polymer compound and the cationic polymer by adjusting the molecular weight of these polymers. Namely, by adjusting the weight average molecular weight of these polymers. By adjusting the weight average molecular weight range of the water-absorbing polymer compound between 10,000 and 300,000 (see amended claims 10 and 12) and by adjusting the weight average molecular weight range of the cationic polymer between 1,000 and 50,000, these polymers mutually dissolve to form a nearly homogeneous state. Such homogeneous state of the claimed composition (claims 10 and 12-15) enables applicants to form an ink jet recording sheet having a directly adhered film on a substrate layer without interposing a glue line. These molecular weights have been included in all composition claims 10 and 11-15.

In fact, when the water-absorbing polymer compound (a) having the prior art weight average molecular weight of 9,000 was used in the present invention, film defects owing to less film strength occurred. Moreover, when the water-absorbing polymer compound (a) having a weight average molecular weight of 50,000 is used in the present invention, a non-uniform film results owing to a large difference of melt viscosity between the water-absorbing polymer compound and the cationic polymer. When the above, prior art composition is used to form an ink-receiving layer, a partial blurring of ink occurs.

In the composition of ink-receiving layer in JP11-123869, it is described that it is desirable to blend solid particles in order to prevent adhesiveness, surface tackiness, blocking property and to add lubricating property (paragraph [0031] in JP11-123869). The solid particles are an essential component to prevent adhesiveness, surface tackiness, blocking property, and the like. These defects of JP11-123869 are caused by insufficient compatibility between the hydrophilic resin and the cationic resin, which results in micro phase separation.

In contrast, in accordance with the present invention, the sheet has no problem of adhesiveness, surface tackiness, blocking property, or the like, because the compatibility between the water-absorbing polymer and the cationic polymer is nearly perfect. Therefore, there is no need to add the solid particles to the resin composition of the present invention. It

is submitted, therefore, that claims 10, and 12-24 are patentable over the combination of Japanese publications, and the rejection under 35 U.S.C. §103(a) should be withdrawn.

NEW ARTICLE AND METHOD CLAIMS 16-38

These claims, like the independent claims originally filed, do not specify the molecular weight of the water-absorbing polymer or the cationic polymer, or claim the molecular weight of only one of the polymers, but all include the feature that the **ink-receiving layer is overlaid onto the substrate layer**, which cannot be achieved in the cited prior art since a glue line **first must be applied to the substrate**, as necessary because of the incompatibility of the combined polymers.

An ink acceptance layer in JP11-123869 is overlaid on a glue line that is formed on a support base-material layer, whereas the resin composition of the present invention is used for forming an ink-receiving layer directly formed on a substrate layer without interposing a glue line. The resin composition of the present invention has both high performance as an ink-receiving layer and high adhesiveness to a substrate layer despite the absence of the glue line.

Although the hydrophilic resin such as an acrylamide polymer is disclosed in JP11-123869 and the same water-absorbing polymer is disclosed in JP09-296035, there is no disclosure directed to the adhesiveness to a substrate layer in JP09-296035. There is no need for the resin composition in JP11-123869 to have adhesiveness to a substrate layer because of the presence of the glue line. In fact, the acrylamide polymer in JP11-123869 has poor adhesiveness to a substrate layer.

Since it is impossible to achieve sufficient adhesiveness by applying the polymer combination of the prior art directly without an intermediate glue line onto the substrate, and since applicants have achieved this unexpected result, it is submitted that new claims 25-38 are patentable over the Japanese publications and the rejection under 35 U.S.C. §103(a) should be withdrawn.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"Version with markings to show changes made."**

It is submitted that all remaining claims are of proper form and scope for allowance. Early and favorable consideration is respectfully requested.

Dated: January 23, 2003

Respectfully submitted,

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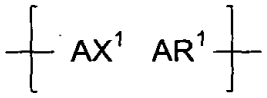
Attorneys for Applicant

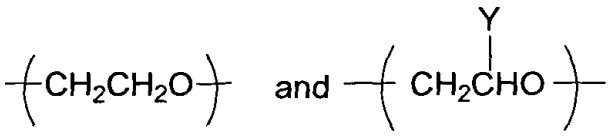
Version With Markings to Show Changes Made

10. A resin composition for ink jet recording comprising (a) a major component of a water-absorbing polymer compound having a weight average molecular weight ranging between 10,000 and 300,000 represented by the formula (I),

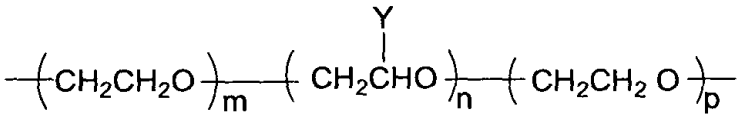


(I)

wherein A consists of



with a manner of linkage therebetween being

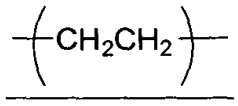


wherein m, n, and p represent integers greater than or equal to 1, and a weight ratio calculated on the basis of each recurrence number m, n, and p predetermined to be: 44 x (m+p)/(molecular weight of the unit of the alkylene oxide having more than or equal to four carbon atoms) x n 94/6 to 80/20,

and the weight ratio calculated on the basis of each recurrence number m and p. p/(m+p) is predetermined to be more than or equal to 50 percent by weight;

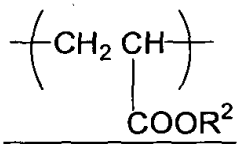
Y represents a hydrocarbon group having two or more carbon atoms; X^1 represents a residue of an organic compound having two active hydrogen groups; and R^1 represents a residue of a dicarboxylic acid compound;

and (b) a cationic polymer compound having a weight average molecular weight ranging between 1,000 and 50,000 with a linear and irregular arrangement, comprising 65 mol% to 99 mol% of an ethylene structural unit represented by formula (II),

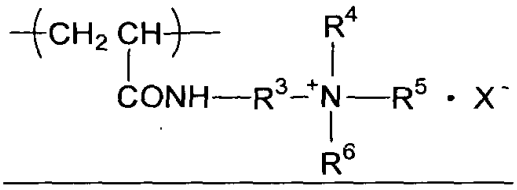


(II)

less than or equal to 15 mol% of an acrylate structural unit represented by formula (III)



wherein R^2 represents an alkyl group having 1 to 4 carbon atoms, and 1 mol% to 35 mol% of an acrylamide structural unit represented by formula (IV)

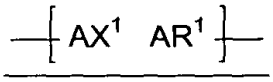


(IV)

wherein R^3 represents an alkylene group having 2 to 8 carbon atoms, R^4 and R^5, respectively, represent an alkyl group having 1 to 4 carbon atoms, R^6 represents an alkyl group having 1 to 12 carbon atoms, an aryl alkyl group having 7 to 12 carbon atoms, or an alicyclic alkyl group having 6 to 12 carbon atoms, and X^- represents a halogen ion, $CH_3OSO_3^-$, or $C_2H_5OSO_3^-$.

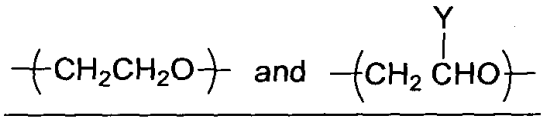
11. Cancelled.

12. A resin composition [of claim 10 wherein (b) is] for ink jet recording comprising (a) a major component of a water- absorbing polymer compound having a weight average molecular weight ranging between 10,000 and 300,000 represented by the formula (I),

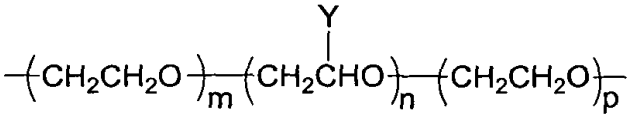


(I)

wherein A consists of



with a manner of linkage therebetween being

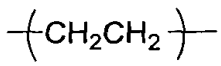


wherein m, n, and p represent integers greater than or equal to 1, and a weight ratio calculated on the basis of each recurrence number m, n, and p predetermined to be: 44 x (m+p)/(molecular weight of the unit of the alkylene oxide having more than or equal to four carbon atoms) x n = 94/6 to 80/20,

and the weight ratio calculated on the basis of each recurrence number m and p. p/(m+p) is predetermined to be more than or equal to 50 percent by weight;

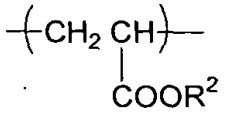
Y represents a hydrocarbon group having two or more carbon atoms; X^1 represents a residue of an organic compound having two active hydrogen groups; and R^1 represents a residue of a dicarboxylic acid compound;

and (b) a cationic polymer compound having a weight average molecular weight ranging between 1,000 and 50,000 with a linear and irregular arrangement, comprising 65 mol% to 99 mol% of an ethylene structural unit represented by formula (II),

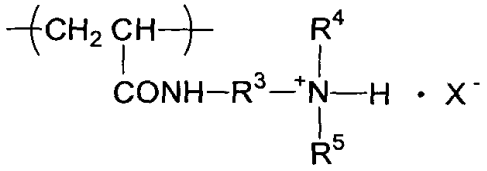


(II)

less than or equal to 15 mol% of an acrylate structural unit represented by formula (III),



wherein R^2 represents an alkyl group having 1 to 4 carbon atoms, and 1 mol% to 35 mol% of an acrylamide structural unit represented by formula (V),



(V)

13. The resin composition of claim 10 wherein a mixing ratio by weight of the water-absorbing polymer compound (a) and the cationic polymer compound (b) is between 50/50 and 99/1.

14. The resin composition of claim 10 further comprising (c) a cationic or nonionic surface active agent.

15. The resin composition of claim 14 wherein an amount. of the cationic or nonionic surface active agent (c) is from 1% by weight to 10% by weight.

16. (Amended) An ink jet recording sheet comprising a substrate layer and an ink-receiving layer that is overlaid said substrate layer, wherein said ink-receiving layer comprises the resin composition according to any of claims 10[through 15].

17. A method of ink jet recording using an ink jet recording sheet according of claim 16, comprising the step of adsorbing small droplets of a water-based color ink applied to the ink-receiving layer.

18. (Amended) A method of producing an ink jet recording sheet comprising the steps of extruding a resin composition that constitutes a substrate layer into a sheet form, while extruding a resin composition for ink jet recording sheet according to claim 10 [any of claims 9 through 15] into a sheet form concurrently with the substrate layer, and forming layers from both of said resin compositions.

19. The resin composition of claim 12 wherein a mixing ratio by weight of the water-absorbing polymer compound (a) and the cationic polymer compound (b) is between 50/50 and 99/1.

20. The resin composition of claim 12 further comprising (c) a cationic or nonionic surface active agent.

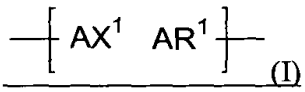
21. The resin composition of claim 20 wherein an amount. of the cationic or nonionic surface active agent (c) is from 1% by weight to 10% by weight.

22. An ink jet recording sheet comprising a substrate layer and an ink-receiving layer that is over-laid said substrate layer, wherein said ink-receiving layer comprises the resin composition according to claim 12.

23. A method of ink jet recording using an ink jet recording sheet according of claim 22, comprising the step of adsorbing small droplets of a water-based color ink applied to the ink-receiving layer.

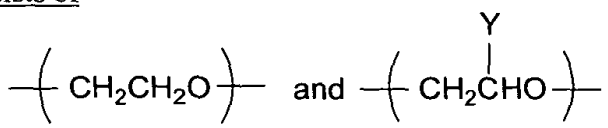
24. A method of producing an ink jet recording sheet comprising the steps of extruding a resin composition that constitutes a substrate layer into a sheet form, while extruding a resin composition for ink jet recording sheet according to claim 12 into a sheet form concurrently with the substrate layer, and forming layers from both of said resin compositions.

25. An ink jet recording sheet comprising a substrate layer and an ink-receiving layer that is overlaid onto said substrate layer, wherein said ink-receiving layer comprises [the resin composition according to any of claims 10 through 15] (a) a major component of a water-absorbing polymer compound represented by the formula (I),

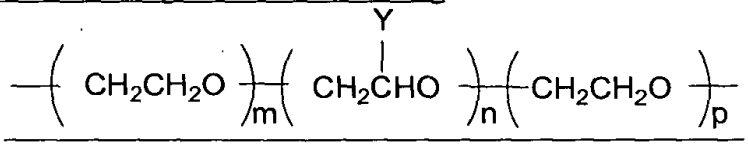


(I)

wherein A consists of



with a manner of linkage therebetween being



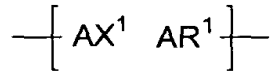
wherein m, n, and p represent integers greater than or equal to 1, and a weight ratio calculated on the basis of each recurrence number m, n, and p predetermined to be: 44 × (m+p)/(molecular weight of the unit of the alkylene oxide having more than or equal to four carbon atoms) × n = 94/6 to 80/20,

and the weight ratio calculated on the basis of each recurrence number m and p, p/(m+p) is predetermined to be more than or equal to 50 percent by weight;

Y represents a hydrocarbon group having two or more carbon atoms; X^1 represents a residue of an organic compound having two active hydrogen groups; and R^1 represents a residue of a dicarboxylic acid compound;

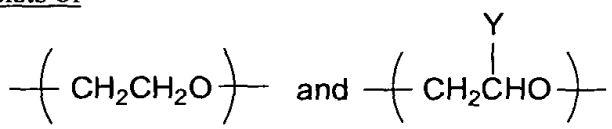
and (b) a cationic polymer compound.

26. A method of producing an ink jet recording sheet comprising the steps of extruding a resin composition that constitutes a substrate layer into a sheet form, extruding a resin composition layer for ink jet recording into a sheet form, and overlaying the ink jet recording layer onto the substrate layer, wherein the ink jet recording layer comprises, (a) a major component of a water-absorbing polymer compound represented by the formula (I),

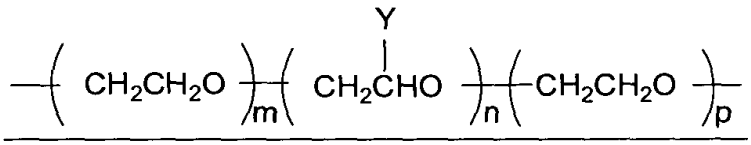


(I)

wherein A consists of



with a manner of linkage therebetween being



wherein m, n, and p represent integers greater than or equal to 1, and a weight ratio calculated on the basis of each recurrence number m, n, and p predetermined to be: 44 × (m+p)/(molecular weight of the unit of the alkylene oxide having more than or equal to four carbon atoms) × n = 94/6 to 80/20,

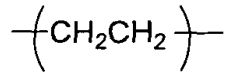
and the weight ratio calculated on the basis of each recurrence number m and p, p/(m+p) is predetermined to be more than or equal to 50 percent by weight;

Y represents a hydrocarbon group having two or more carbon atoms; X^1 represents a residue of an organic compound having two active hydrogen groups; and R^1 represents a residue of a dicarboxylic acid compound;

and (b) a cationic polymer compound.

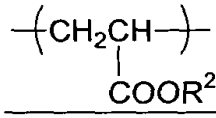
27. The method of claim 26, wherein the substrate layer and the ink jet recording sheet are extruded concurrently while overlaying the ink jet recording layer onto the substrate layer.

28. The ink jet recording sheet of claim 25, wherein the cationic polymer (b) has a weight average molecular weight ranging between 1,000 and 50,000 with a linear and irregular arrangement, comprising 65 mol% to 99 mol% of an ethylene structural unit represented by formula (II),



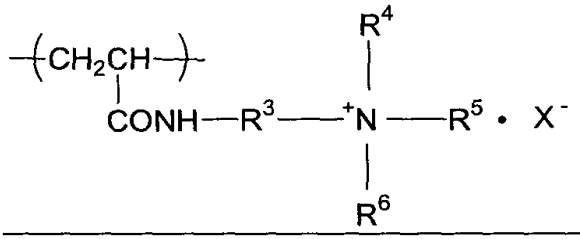
(II),

less than or equal to 15 mol% of an acrylate structural unit represented by formula (III),



(III)

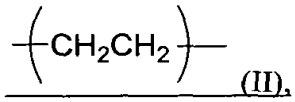
wherein R^2 represents an alkyl group having 1 to 4 carbon atoms, and 1 mol% to 35 mol% of an acrylamide structural unit represented by formula (IV),



(IV)

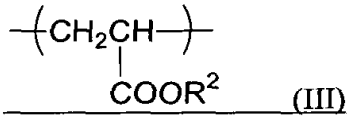
wherein R^3 represents an alkylene group having 2 to 8 carbon atoms, R^4 and R^5, respectively, represent an alkyl group having 1 to 4 carbon atoms, R^6 represents an alkyl group having 1 to 12 carbon atoms, an aryl alkyl group having 7 to 12 carbon atoms, or an alicyclic alkyl group having 6 to 12 carbon atoms, and X^- represents a halogen ion, $CH_3OSO_3^-$, or $C_2H_5OSO_3^-$.

29. The ink jet recording sheet of claim 25, wherein the cationic polymer (b) has a weight average molecular weight ranging between 1,000 and 50,000 with a linear and irregular arrangement, comprising 65 mol% to 99 mol% of an ethylene structural unit represented by formula (II),



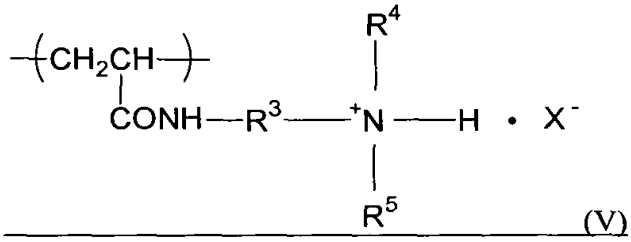
(II),

less than or equal to 15 mol% of an acrylate structural unit represented by formula (III),



(III)

wherein R^2 represents an alkyl group having 1 to 4 carbon atoms, and 1 mol% to 35 mol% of an acrylamide structural unit represented by formula (V):



(V)

wherein R^3 represents an alkylene group having 2 to 8 carbon atoms, R^4 and R^5, respectively, represent an alkyl group having 1 to 4 carbon atoms, and X^- represents a halogen ion, $CH_3OSO_3^-$ or $C_2H_5OSO_3^-$.

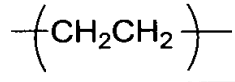
30. The ink jet recording sheet of claim 25 wherein a mixing ratio by weight of the water-absorbing polymer compound (a) and the cationic polymer compound (b) is between 50/50 and 99/1.

31. The ink jet recording sheet of claim 25 further comprising (c) a cationic or nonionic surface active agent.

32. The ink jet recording sheet of claim 31 wherein an amount of the cationic or nonionic surface active agent (c) is from 1% by weight to 10% by weight.

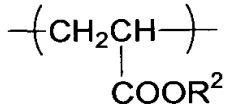
33. A method in accordance with claim 26, wherein the water absorbing polymer compound (a) has a weight average molecular weight ranging between 10,000 and 300,000.

34. A method in accordance with claim 26, wherein the cationic polymer (b) has a weight average molecular weight ranging between 1,000 and 50,000 with a linear and irregular arrangement, comprising 65 mol% to 99 mol% of an ethylene structural unit represented by formula (II),



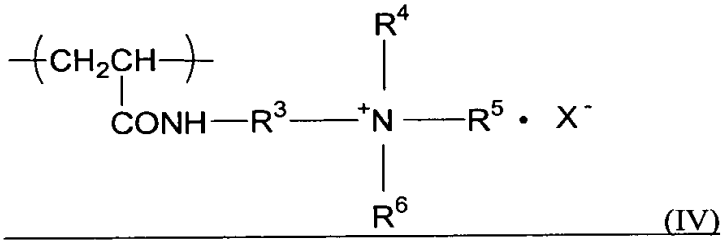
(II)

less than or equal to 15 mol% of an acrylate structural unit represented by formula (III),



(III)

wherein R^2 represents an alkyl group having 1 to 4 carbon atoms, and 1 mol% to 35 mol% of an acrylamide structural unit represented by formula (IV),



(IV)

wherein R^3 represents an alkylene group having 2 to 8 carbon atoms, R^4 and R^5, respectively, represent an alkyl group having 1 to 4 carbon atoms, R^6 represents an alkyl

group having 1 to 12 carbon atoms, an aryl alkyl group having 7 to 12 carbon atoms, or an alicyclic alkyl group having 6 to 12 carbon atoms, and X^- represents a halogen ion, $CH_3OSO_3^-$, or $C_2H_5OSO_3^-$.

35. A method in accordance with claim 34, wherein R^3 represents an alkylene group having 2 to 8 carbon atoms, R^4 and R^5, respectively, represent an alkyl group having 1 to 4 carbon atoms, and X^- represents a halogen ion, $CH_3OSO_3^-$ or $C_2H_5OSO_3^-$.

36. A method in accordance with claim 26, wherein a mixing ratio by weight of the water-absorbing polymer compound (a) and the cationic polymer compound (b) is between 50/50 and 99/1.

37. A method in accordance with claim 26, further comprising (c) a cationic or nonionic surface active agent.

38. A method in accordance with claim 37, wherein an amount of the cationic or nonionic surface active agent (c) is from 1% by weight to 10% by weight.